

ZOOLOGY.—*Another sea anemone from California and the types of certain Californian anemones.* CADET HAND, University of California. (Communicated by Fenner A. Chace, Jr.)

Since I completed my earlier study of the sea anemones of central California (Hand, 1955, 1955a, 1956), a species not included in those reports has come to my attention, and, moreover, those earlier studies did not indicate the location or disposition of the types of the several new species described. The present account therefore will add one more species to those recorded for the area studied and will give the needed data regarding the disposition of the types.

#### PART I. NEMATOSTELLA

The additional species is *Nematostella vectensis* Stephenson. This anemone probably is the "will-o-the-wisp" species that I have hunted for more than 10 years in California. In 1946, the late Prof. S. F. Light described to me a very small anemone he had seen in small pools on the Salicornia marshes of Richardson's Bay (a part of San Francisco Bay). Several years later another story of a small anemone in pools in the marshes of Tomales Bay reached my ears. Although my friends and students and I have many times searched pools in Salicornia marshes we have never seen the anemone in the field. However, in May 1953 a zoology student (John Petersen) collected 36 specimens of *N. vectensis* in a pool on the landward edge of a Salicornia marsh on Bay Farm Island, Alameda County, Calif. This collection has come into my possession through the kindness of Dr. Willard Hartman, of Yale University.

*Nematostella*, as a genus, is a member of the family Edwardsiidae and is readily distinguished from other edwardsians by the lack of nemathobomes, its possession of very short microcnemes in the upper column, and the unique nematosomes found in the coelenteron. The family Edwardsiidae and genus *Nematostella* are well diagnosed in Carlgren (1949), and those definitions need not be repeated here. A brief description of *N. vectensis* follows.

#### *Nematostella vectensis* Stephenson

1935. *Nematostella vectensis* Stephenson, p. 44.  
 1946. *Nematostella pellucida* Crowell, p. 58.  
 1949. *Nematostella vectensis* Carlgren, p. 26.  
 1949. *Nematostella pellucida* Carlgren, p. 26.

The following description is based upon a study of 36 preserved specimens, of which 7 have been prepared as serial sections for histological study. The nematocyst data is compounded from a study of four specimens from Bay Farm Island, two from Woods Hole, Mass., and one from Shinglestreet, Suffolk, England.

*Description.*—A small anemone with up to 16 tentacles, the outer tentacles slightly longer than the inner ones. In some of the specimens the inner tentacles are raised above the mouth, while the outer ones are reflexed down the column. The tentacular crown may approach 8 mm in diameter. The column is vermiform and in very large specimens is 15 mm long. The column is readily divisible into physa and scapus, but a scapulus and capitulum are not clearly distinguishable. In many specimens the greatest diameter of the column is at the area of junction of physa and scapus. The diameter there seldom exceeded 2.5 mm and the diameter at the junction of the tentacles and column usually is about one half of this.

Internally there are eight macrocnemes of the normal *Edwardsia* type and eight microcnemes which occur bilaterally as a pair in the dorso-lateral exocoels and single microcnemes at the position of the fifth and sixth couples of mesenteries. This condition is well illustrated by Crowell (1946, p. 59). The microcnemes extend no further down the column than the insertion of the tentacles. The retractors of the macrocnemes bear, in large specimens, from as few as 6 to more than 12 branches. Gonads, when present, occur on all the macrocnemes.

The nematocysts were as follows:

#### Tentacles:

- Spirocysts 11-21  $\times$  1.5-2.0 $\mu$   
 Basitrichs 10-13  $\times$  2.0-2.5 $\mu$   
 Basitrichs 20-25  $\times$  2.0-3.0 $\mu$

#### Column:

- Basitrichs 10-13  $\times$  2.0-2.5 $\mu$

#### Throat and filaments:

- Basitrichs 14-18  $\times$  2.5-3.0 $\mu$   
 Microbasic mastigophores 18-25  $\times$  3.5-5.0 $\mu$

#### Nematosomes:

- Basitrichs 14-17  $\times$  2.5-3.0 $\mu$   
 Microbasic mastigophores 17-22  $\times$  4.0-5.0 $\mu$

*Discussion.*—The nematosomes are numerous, although no attempt to count them in a single

specimen was made. They are about  $30\mu$  in diameter and histologically look very much like bits of the endoglandular tracts of the mesenterial filaments. The function of the nematosomes remains unknown, although in one set of sections I have studied it appears that the nematosomes have aggregated around a small copepod which the anemone had ingested. This might suggest that they gather around ingested food items to aid in their digestion or to subdue active prey with their nematocysts. These multicellular, motile organelles, whatever their function, occur only in *Nematostella* and are unique in the animal kingdom, unless they are comparable to the urns of certain sipunculids.

The endom reported above differs slightly from that reported by Stephenson (1935) and Crowell (1946). For example, Crowell reported only a single-size category of basitrichs from the tentacles. I have examined the nematocysts of two *Nematostella* from Woods Hole which Dr. Crowell kindly sent to me, and I find in his specimens that I can readily separate the basitrichs into two-size categories. I note also that Stephenson reported two sizes of "nematocysts" from the tentacles, and in checking the tentacles of a specimen kindly sent to me by Miss E. A. Robson from England I find these are the two sizes of basitrichs. I have checked the nematocysts of the several tissues on specimens from Woods Hole, England, and California and find that they all agree very well in all respects. Such slight differences in the sizes as do occur between the nematocysts reported here and those recorded by Stephenson and Crowell undoubtedly could be reconciled if a larger series of animals from each locality could be examined. These differences are not thought to be significant indications of specific differences.

I have also compared transverse serial sections of specimens from all three localities. The number of siphonoglyphs is constant at 1, the macrocnemes and microcnemes at 8, and the number of branches in the retractor muscles varies from about 6 to more than 12 in each population. The number of tentacles apparently does not exceed 18 in any of the geographic representatives of the species, and the commonest number seems to be 16. The size and general appearance of this animal at each of the three localities are also quite similar, as is their habitat in pools where the salinity may be highly variable. It is concluded, therefore, that only one species, *Nematostella*

*vectensis* Stephenson, is involved in the three localities considered.

There are two other species of *Nematostella*, namely, *N. polaris* (Carlgren, 1921, p. 65) and *N. nathorstii* (Carlgren, 1921, p. 67). Both of these are known only from the Arctic Ocean in the area of East Greenland and Spitsbergen. These species were dredged in quite shallow water, 5-45 meters, except for one specimen of *N. nathorstii* from 1,000 meters. *N. polaris*, as it was described, seems quite indistinguishable from *N. vectensis*, while *N. nathorstii* can readily be distinguished from the others by its large nematocysts. The genus *Nematostella* thus seems to have at least two, and possibly three species, and can be described as a circumpolar genus.

Several species and species-groups of anemones have circumpolar distributions, ranging southward into temperate waters in the Atlantic and Pacific Oceans. Examples are *Halcampa* and *Tealia* (Hand, 1955 and 1955a). The genus *Epiactis* is well represented also in both temperate and arctic waters (Carlgren, 1921; Hand, 1955a). However, in no example that I can cite among anemones is there a single species which shows a comparable range of habitats to that between *N. vectensis* and *N. polaris*. However, when we consider the variable environment in which *N. vectensis* lives we see that this animal exists throughout an unusually wide range of factors. For instance, these shallow pools along our California coast vary in temperature from about  $0^{\circ}\text{C}$  to  $30^{\circ}\text{C}$ , depending upon the season of the year, and their salinity must vary from less than 50 per cent of normal sea water to probably more than 100 per cent of normal. Arctic waters on the other hand are hardly variable at all, but during cold dry weather a temperate pool could have the same temperature-salinity characteristics as arctic water. Thus, *N. vectensis* might be able to exist in the Arctic Ocean. It does not seem too probable, however, that *N. polaris* and *N. vectensis* are the same species, but, if they are then *N. polaris* has priority over *N. vectensis* as a name.

## PART II. THE TYPES OF CERTAIN CALIFORNIA SEA ANEMONES

It has not been possible for me to make a study of the location of the types of several of the sea anemones discussed in my earlier papers. For other species, whose types have been designated, I have included their location in the list below.

Type specimens, and in some instances, paratypes, have been deposited by me in the collections of the United States National Museum for the species I have described as new. Many of the California anemones were first recorded from other than Pacific waters and others were described by early European authors. In most instances where types have not been designated it seems highly probable that the specimens originally described no longer exist. However, type specimens may yet be located in various European collections, and in the absence of a comprehensive search of the many possible collections I do not deem it wise to select types from among the material I have available. The following list of the sea anemones of central California gives the location of the types where these are known:

- Corynactis californica* Carlgren, 1936, p. 17. Holotype: U.S.N.M. 43060.  
*Halcampa decententaculata* Hand, 1955, p. 360. Lectotype: U.S.N.M. 50637.  
*Cactosoma arenaria* Carlgren, 1931, p. 39. Type not designated by Carlgren?

Carlgren (1931) had but a single specimen, which he states was poorly preserved, at the time he originally described this species. In 1936, he again briefly describes this species and mentions that the nematocysts of a single specimen from Monterey, Calif., are in good agreement with the "type specimen." I have a single specimen from the breakwater at San Pedro, Calif., the type locality of this species. This specimen is now deposited in the U. S. National Museum as a *topotype*, no. 50636. It may be discovered that the original specimen is in the collections at Lund, and therefore is the holotype. If that specimen cannot be located it may then be desirable to designate this *topotype* above as the neotype.

- Epiactis prolifera* Verrill, 1869, p. 492. Type not designated but may exist in the collections of Yale University.  
*Anthopleura xanthogrammica* (Brandt, 1835, p. 212.) Type not designated and probably nonexistent.  
*Anthopleura elegantissima* (Brandt, 1835, p. 213.) Type not designated and probably nonexistent.  
*Anthopleura artemisia* (Pickering in Dana, 1849, p. 149.) Type not designated and probably nonexistent.

- Tealia crassicornis* (Mueller, 1776, p. 231.) Type not designated and probably nonexistent.  
*Tealia coriacea* (Cuvier, 1798, p. 653.) Type not designated and probably nonexistent.  
*Tealia lofolensis* (Danielssen, 1890, p. 47.) Type not designated and probably nonexistent.  
*Zaolutus actius* Hand, 1955a, p. 89. Lectotype: U.S.N.M. 50638. Paratypes: 2 specimens. U.S.N.M. 50639.  
*Metridium senile fimbriatum* (Verrill, 1865, p. 195.) There is no indication that Verrill designated a type specimen for his species or that the material he based the original description upon any longer exists. The following specimens have been deposited in the United States National Museum: Topotype; 1 specimen: U.S.N.M. 50640 (this specimen is figured as figure 37A in Hand, 1956, p. 243). Topotypes; 4 specimens: U.S.N.M. 50641.  
*Metridium exilis* Hand, 1956, p. 206. Lectotype: U.S.N.M. 50642.  
*Haliplanella luciae* (Verrill, 1898, p. 413.) Type not designated and probably nonexistent.  
*Diadumene leucolena* (Verrill, 1866, p. 336.) Type not designated and probably nonexistent. Carlgren (1950) examined two specimens of this species collected by Hargitt. These specimens were loaned to Carlgren by the United States National Museum, and if these specimens can be found, one of them should be designated as the neotype.  
*Diadumene franciscana* Hand, 1956, p. 230. Lectotype: U.S.N.M. 50643. Paratypes: 3 specimens. U.S.N.M. 50644.  
*Diadumene lighti* Hand, 1956, p. 237. Lectotype: U.S.N.M. 50645. Paratypes: 6 specimens. U.S.N.M. 50646.  
*Nematostella vectensis* Stephenson, 1935, p. 44. No types designated.

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*It is the glory of God to conceal a thing; but the honor of a kings is to search out a matter.*—SOLOMON.